Claims

1. A heterogeneous ruthenium catalyst comprising silicon dioxide as support material, wherein the percentage ratio of the signal intensities of the $Q_2$ and $Q_3$ structures $Q_2/Q_3$ in the silicon dioxide determined by means of solid-state $^{29}$Si-NMR is less than 25.

2. The ruthenium catalyst according to claim 1, wherein the percentage ratio of the signal intensities of the $Q_2$ and $Q_3$ structures $Q_2/Q_3$ is less than 20.

3. The ruthenium catalyst according to claim 1, wherein the percentage ratio of the signal intensities of the $Q_2$ and $Q_3$ structures $Q_2/Q_3$ is less than 15.

4. The ruthenium catalyst according to any of the preceding claims, wherein the total concentration of Al(III) and Fe(II and/or III) in the silicon dioxide is less than 300 ppm by weight.

5. The ruthenium catalyst according to any of claims 1 to 3, wherein the total concentration of Al(III) and Fe(II and/or III) in the silicon dioxide is less than 200 ppm by weight.

6. The ruthenium catalyst according to any of the preceding claims, wherein alkaline earth metal cations ($M^{2+}$) are comprised in the silicon dioxide in a weight ratio of M(II) : (Al(III) + Fe(II and/or III)) of > 0.5.

7. The ruthenium catalyst according to any of claims 1 to 5, wherein alkaline earth metal cations ($M^{2+}$) are comprised in the silicon dioxide in a weight ratio of M(II) : (Al(III) + Fe(II and/or III)) of > 1.

8. The ruthenium catalyst according to any of claims 1 to 5, wherein alkaline earth metal cations ($M^{2+}$) are comprised in the silicon dioxide in a weight ratio of M(II) : (Al(III) + Fe(II and/or III)) of > 3.

9. The ruthenium catalyst according to any of the preceding claims which has been produced by single or multiple impregnation of the support material with a solution of ruthenium(III) acetate, drying and reduction.

10. The ruthenium catalyst according to any of the preceding claims, wherein the support material based on amorphous silicon dioxide has a BET surface area (in accordance with DIN 66131) in the range from 30 to 700 $m^2/g$.

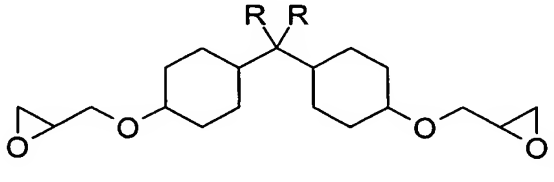
11. The ruthenium catalyst according to any of the preceding claims, wherein the catalyst comprises from 0.2 to 10% by weight of ruthenium, based on the weight of the silicon dioxide support material.

12. The ruthenium catalyst according to any of the preceding claims, wherein the catalyst comprises less than 0.05% by weight of halide (determined by ion chromatography), based on the total weight of the catalyst.

13. The ruthenium catalyst according to any of the preceding claims, wherein the catalyst comprises a support material based on silicon dioxide and elemental ruthenium, with the ruthenium being concentrated as a shell at the catalyst surface.

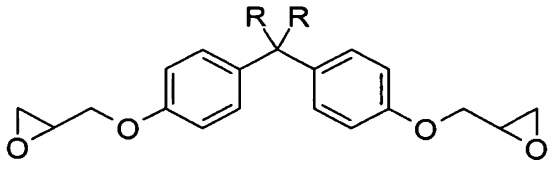
14. The ruthenium catalyst according to the preceding claim, wherein the ruthenium in the shell is partially or fully crystalline.

15. A process for preparing a bisglycidyl ether of the formula I



(I),

where R is $CH_3$ or H, by ring hydrogenation of the corresponding aromatic bisglycidyl ether of the formula II



(II)

in the presence of a catalyst, wherein a heterogeneous ruthenium catalyst according to any of claims 1 to 14 is used.

16. The process according to claim 15, wherein the aromatic bisglycidyl ether of the formula II which is used has a content of corresponding oligomeric bisglycidyl ethers of less than 10% by weight.

17. The process according to claim 15, wherein the aromatic bisglycidyl ether of the formula II which is used has a content of corresponding oligomeric bisglycidyl ethers of less than 5% by weight.

18. The process according to claim 15, wherein the aromatic bisglycidyl ether of the formula II which is used has a content of corresponding oligomeric bisglycidyl ethers of less than 1.5% by weight.

19. The process according to claim 15, wherein the aromatic bisglycidyl ether of the formula II which is used has a content of corresponding oligomeric bisglycidyl ethers of less than 0.5% by weight.

20. The process according to any of claims 16 to 19, wherein the content of oligomeric bisglycidyl ethers is determined by heating the aromatic bisglycidyl ether at 200°C for 2 hours and at 300°C for a further 2 hours, in each case at 3 mbar.

21. The process according to any of claims 16 to 19, wherein the content of oligomeric bisglycidyl ethers is determined by means of GPC (gel permeation chromatography).

22. The process according to the preceding claim, wherein the content of oligomeric bisglycidyl ethers in % by area determined by GPC measurement is equated to a content in % by weight.

23. The process according to any of claims 16 to 22, wherein the oligomeric bisglycidyl ethers have a molecular weight determined by GPC in the range from 380 to 1500 g/mol.

24. The process according to any of claims 16 to 22, wherein the oligomeric bisglycidyl ethers have a molecular weight in the range from 568 to 1338 g/mol when R = H and have a molecular weight in the range from 624 to 1478 g/mol when R = $CH_3$.

25. The process according to any of claims 15 to 24, wherein the hydrogenation is carried out at a temperature in the range from 30 to 150°C.

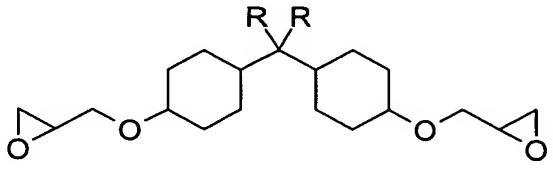
26. The process according to any of claims 15 to 25, wherein the hydrogenation is carried out at an absolute hydrogen pressure in the range from 10 to 325 bar.

27. The process according to any of claims 15 to 26, wherein the hydrogenation is carried out over a fixed bed of catalyst.

28. The process according to any of claims 15 to 26, wherein the hydrogenation is carried out in a liquid phase in which the catalyst is present in the form of a suspension.

29. The process according to any of claims 15 to 28, wherein the aromatic bisglycidyl ether of the formula II is used as a solution in an organic solvent which is inert in respect of the hydrogenation, with the solution comprising from 0.1 to 10% by weight, based on the solvent, of water.

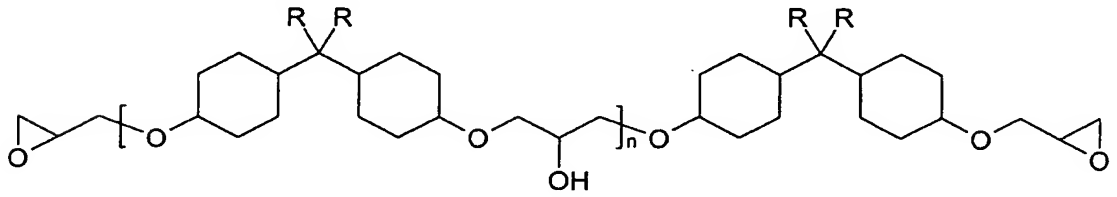
30. A bisglycidyl ether of the formula I



(I),

where R is $CH_3$ or H, which can be prepared by a process according to any of claims 15 to 29.

31. The bisglycidyl ether according to the preceding claim which has a content of corresponding oligomeric ring-hydrogenated bisglycidyl ethers of the formula



where n = 1, 2, 3 or 4, of less than 10% by weight

32. The bisglycidyl ether according to the preceding claim which has a content of corresponding oligomeric ring-hydrogenated biglycidyl ethers of less than 5% by weight.

33. The bisglycidyl ether according to claim 31 which has a content of corresponding oligomeric ring-hydrogenated bisglycidyl ethers of less than 1.5% by weight.

34. The bisglycidyl ether according to claim 31 which has a content of corresponding oligomeric ring-hydrogenated bisglycidyl ethers of less than 0.5% by weight.

35. The bisglycidyl ether according to any of claims 31 to 34, wherein the content of oligomeric ring-hydrogenated bisglycidyl ethers is determined by heating the aromatic bisglycidyl ether for 2 hours at 200°C and for a further 2 hours at 300°C, in each case at 3 mbar.

36. The bisglycidyl ether according to any of claims 31 to 34, wherein the content of oligomeric ring-hydrogenated bisglycidyl ethers is determined by GPC measurement (gel permeation chromatography).

37. The bisglycidyl ether according to the preceding claim, wherein the content of oligomeric bisglycidyl ethers in % by area determined by GPC measurement is equated to a content in % by weight.

38. The bisglycidyl ether according to any of claims 30 to 37 which has a total chlorine content determined in accordance with DIN 51408 of less than 1000 ppm by weight

39. The bisglycidyl ether according to any of claims 30 to 38 which has a ruthenium content determined by mass spectrometry combined with inductively coupled plasma (ICP-MS) of less than 0.3 ppm by weight.

40. The bisglycidyl ether according to any of claims 30 to 39 which has a platinum-cobalt color number (APHA color number) determined in accordance with DIN ISO 6271 of less than 30.

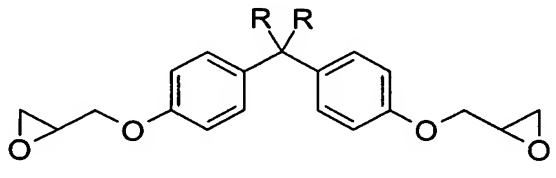
41. The bisglycidyl ether according to any of claims 30 to 40 which has an epoxy equivalent weight determined in accordance with the standard ASTM-D-1652-88 in the range from 170 to 240 g/equivalent.

42. The bisglycidyl ether according to any of claims 30 to 41 which has a proportion of hydrolyzable chlorine determined in accordance with DIN 53188 of less than 500 ppm by weight.

43. The bisglycidyl ether according to any of claims 30 to 42 which has a kinematic viscosity determined in accordance with DIN 51562 of less than 800 $mm^2/s$ at 25°C.

44. The bisglycidyl ether according to any of claims 30 to 43 which has a cis-cis:cis-trans:trans-trans isomer ratio in the range 44-63%:34-53%:3-22%.

45. The bisglycidyl ether according to any of claims 30 to 44 obtained by complete hydrogenation of the aromatic rings of a bisglycidyl ether of the formula II




(II)

where R is $CH_3$ or H, with the degree of hydrogenation being > 98%.